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Suboptimal health status, COVID-19 psychology, and cultural value impact on post-pandemic outbound travel

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ABSTRACT

Suboptimal health has become a core public health challenge, especially during the pandemic. This study adopts an interdisciplinary perspective to examine the relationships between suboptimal health status, COVID-19 fear and stress, cultural values, and outbound travel. A theoretical model was evaluated using data from 800 Beijing residents, 439 of whom were in suboptimal health. Four dimensions of suboptimal health (fatigue, mental status, immune system, and cardiovascular system) significantly affected COVID-19 stress and fear. Post-pandemic travel intention was positively related to fatigue symptoms and leisure and life enjoyment but negatively associated with COVID-19 stress. Suggestions for highlighting travellers' health status and promoting holistic health through post-pandemic travel are provided.

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Suboptimal health status; COVID-19 stress; COVID-19 fear; post-pandemic outbound travel; leisure and life enjoyment; multigroup analysis

Introduction

Everyday life is increasingly stressful, leading many tourists to experience nonspecific health concerns not readily detectable by medical diagnostics. While public health has become a primary concern in tourism research after the COVID-19 outbreak, the consideration of tourists' health status has been neglected. Suboptimal health status (SHS) is a subclinical and reversible health condition that is geographically ubiquitous in modern society (Wang et al., 2021). SHS symptoms hinder one's adaptability, physiological state, and vitality; however, how people's SHS affects travel psychology and decisions in this post-pandemic era is unknown, yet vital.

SHS has been observed in China, Japan, Ghana, Canada, and Australia (Anto et al., 2020). More than 65% of China's population was classified as having SHS (Wang et al., 2016) before the pandemic. This condition may be underreported due to a lack of publicly available statistics during the pandemic. SHS can easily go unnoticed: 72.8% of 6000 Chinese citizens displayed SHS despite deeming themselves 'healthy' (Xue et al., 2021). Xu et al. (2020) collected data from 48,978 Chinese, and 69.46% of the sample had SHS; complaints included distractibility (30.89%), forgetfulness (38.53%), and headache or dizziness (30.10%). COVID-19 broke out in December 2019 and has drastically affected personal health. From a public health perspective, Watkins and Wulaningsih (2020) identified three ways that the pandemic has affected or will influence mortality: 1) patients with COVID-19 have taken priority when it comes to health system resources, leading to a rise in overall mortality; 2) economic recessions and record unemployment are expected as a result of the pandemic, and 3) economic responses will follow from unemployed people having limited access to healthcare. Scholars have also attended to pandemic-related mental health issues (Moreno et al., 2020). Pfefferbaum and North (2020) found that public health emergencies (e.g. COVID-19) can affect people's health, safety, and well-being through insecurity, confusion, emotional isolation, and stigma. Both healthy individuals and those who contract the disease may react to stressors in various ways, including by engaging in unhealthy behaviours and ignoring public health mandates (Pfefferbaum & North, 2020). For example, Liu et al. (2021) analyzed SHS and its influencing factors among nurses in China during COVID-19 and found that nurses suffered from poor mental health.

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SHS represents a public health concern among various populations, especially considering COVID-19 and its impacts on daily life. People with this condition should be more carefully profiled in tourism and public health. The potential connection between personal health and tourism has gained particular interest in recent years, especially since vacationing has been shown to improve people's physical and mental states (Zins & Ponocny, 2022). Wen et al. (2022) considered the tourism engagement of people living with SHS and collected data related to sociodemographics, tourism-related characteristics, and lifestyles. Specific marketing strategies and tourism products are needed for people living with SHS (Wen et al., 2022).

The pandemic has shattered modern life. The current study introduces SHS as an antecedent of Chinese individuals' travel behaviours amid the pandemic. Many Chinese residents may avoid risks due to residual fear associated with COVID-19 and similar diseases. For example, the Chinese may choose not to travel abroad as the pandemic continues. Travel-related behaviour during the pandemic thus presents a unique context for SHS research. Several pandemic-oriented constructs were included in this research, including the pandemic's effects on perceived stress, fear of COVID-19, and tourists' intentions to travel overseas (Ahorsu et al., 2020; Das & Tiwari, 2021).

Culture is also an essential factor dictating Chinese tourists' behaviours (Xu et al., 2008). Tourists' demands and expectations can best be addressed with a sense of the cultural beliefs that guide their actions. Cultural and behavioural effects are similarly integral when working with tourists with SHS. Huang and Wen (2021) developed and validated a Chinese cultural values scale in tourism comprising five dimensions – *leisure and life enjoyment*, *filial piety and relationship*, *self-fulfillment*, *righteousness*, and *humanity*. The present study focused on the *leisure and life enjoyment* (LLE) dimension to explore the travel behaviours of Chinese travellers with SHS. This value reflects typical tourism motivations such as indulgence, comfort, and entertainment. The constructs above contribute to a conceptual model of outbound tourism among Chinese travellers with SHS during and after COVID-19.

This study aimed to bring an emerging tourist population – individuals with SHS – into the tourism literature by integrating salient factors to examine their travel-related behaviours. A theoretical model reflecting the relationships among SHS and travel-related factors in the context of COVID-19 was proposed and empirically tested. Further, the study makes theoretical contributions by exploring the moderating effects of travellers' characteristics (i.e. travel frequency, travel preferences, travel length, and travel expenditure) on the research framework.

Literature review

COVID-19 fear

COVID-19 is a highly contagious disease caused by the SARS-CoV-2 virus (Martin et al., 2020). This virus can be transmitted via droplets, aerosols, close contact, and contaminated surfaces (WHO, 2021). Any person of any age can contract COVID-19 and may become seriously ill or die. The world has seen more than 430 million confirmed cases of COVID-19 and over 5 million confirmed deaths as of February 25, 2022 (WHO, 2022). The outbreak has become the most devastating pandemic in human history, radically disrupting global mobility (Khalfaoui et al., 2021). Even more alarming, the emergence of the alpha, beta, delta, and omicron SARS-CoV-2 variants has resulted in massive waves of new infections across countries and continents (Karim & Karim, 2021). High infection and mortality rates, and uncertainty about the disease's origin, nature, and course also have psychological effects: some people suffer from heightened anxiety, helplessness, and persistent fear of risk (Ahorsu et al., 2020). Extensive media coverage and misinformation about COVID-19 have exacerbated public panic (Williams et al., 2022).

Fear describes an emotion elicited by the feeling that something may be threatening, harmful, or painful (Pakpour & Griffiths, 2020). Humans' survival entails an adaptive fear system, in which fear can activate defensive avoidance that prompts a person to mitigate potential threats (McNaughton & Corr, 2004). Travelling in a pandemic-ravaged world carries an imminent risk of infection (Kim et al., 2021). In addition, travellers' perceived destination safety declines as the local community's health, economy, and wellbeing are jeopardized (Karim & Karim, 2021). Therefore, travellers' fear of public health threats might motivate them to engage in safety-seeking behaviours and risk-averse actions (e.g. previous non-essential travel activities) (Miao et al., 2021; Zheng et al., 2021). Zheng et al. (2022) found that COVID-19 fear increased post-pandemic travel avoidance. The following hypothesis is proposed accordingly:

> **Hypothesis 1:** Fear of COVID-19 significantly decreases outbound travel intentions.

COVID-19 stress

Stress can be defined as 'reactions of the body to forces of a deleterious nature, infections, and various abnormal states that tend to disrupt its normal physiologic equilibrium' (Noble, 2002, p. 37). The transactional model of stress (Lazarus & Folkman, 1984) postulates that people continually evaluate their experiences for signs

of stress. Individuals generally devote cognitive and behavioural effort to coping with stress to manage external and/or internal demands beyond their usual capacity (Lazarus & Folkman, 1984). Governments implemented containment measures such as mandatory mask-wearing, city lockdowns, and quarantine guidelines during the height of the pandemic. Consequences of the pandemic (e.g. infection and death) have generated stress (Jiang & Stylos, 2021).

Leisure travel can either relieve (Chen et al., 2016) or intensify stress (Zhu et al., 2020). COVID-19 has elevated stress among people in various countries; however, few studies have examined how perceived stress during the pandemic influenced travel intentions (Peterkin et al., 2022). Transactional theory (Lazarus & Folkman, 1984) indicates that various techniques are available to manage stress. These coping strategies represent cognitive and behavioural responses to stressors (Iwasaki & Schneider, 2003). Coping can be either problem-focused or emotion-focused: the former attempts to change the cause of stress or to resolve problems directly. The latter seeks to alleviate emotional suffering through distancing and selective attention (Lazarus & Folkman, 1984). Travel may expose people to potential contagion hazards and other stressors (e.g. local quarantine policies and changes to accepted pre-entry COVID-19 tests). Travellers may therefore opt to avoid these stressors by reducing travel altogether, as suggested below:

> **Hypothesis 2:** Stress from COVID-19 significantly decreases outbound travel intentions.

Suboptimal health status

SHS has been deemed a 'third status' distinct from health and illness (Zhang & Shao, 2015) and an 'intermediate health status' between optimal health and disease (Hou et al., 2018). This state can involve chronic fatigue, ambiguous health complaints, and low energy lasting at least three months. It covers a range of uncomfortable physical and mental conditions not diagnosable with clinical criteria (Wang et al., 2016). The medical science literature indicates that SHS can affect one's cardiovascular system, digestive system, immune system, and mental status (e.g. Adua et al., 2019; Hou et al., 2018). In order to assess SHS, Yan et al. (2009) developed and validated a scale (the SHSQ-25) comprising 25 items across five health domains – fatigue, the cardiovascular system, the digestive tract, the immune system, and mental status.

Recently, SHS has become a research focus in the medical sciences (Wang et al., 2021). Individuals with SHS are likely to have pathological abnormalities and even chronic diseases (Wang et al., 2016). Correlations have been documented between SHS and endothelial dysfunction, metabolic syndrome, cardiovascular risks, type 2 diabetes, a higher incidence of preeclampsia, increased oxidative stress and unbalanced angiogenic growth mediators, and psychological conditions such as obsessive-compulsive disorder and depression (e.g. Adua et al., 2019; Anto et al., 2020; Yan et al., 2012). Although health issues can affect consumers' activities (Moorman, 2002), researchers have rarely examined whether and how SHS informs travellers' psychology and behaviours.

Fatigue is a decline in mental and/or physical capacity due to excessive mental and/or physical activity (Ishii et al., 2014). A person with fatigue may feel lethargic and experience headaches, dizziness, and stiff joints (Yan et al., 2009). Fatigue and psychological distress are distinct yet interrelated (e.g. Bültmann et al., 2002). Fatigue can compound other stressors during the pandemic: it can be as debilitating as pain, be hard to control, and diminish the quality of life (Overman et al., 2016). Fatigue can also cause an emotional numbness where affected individuals are likely to be unmoved by threats (e.g. COVID-19) that usually evoke anxiety (Roberts, 2019). Since fatigue decreases individuals' interest and engagement, tourists who are affected by fatigue may be less active in physical activities (Marcora et al., 2009). The following hypothesis is thus put forth:

> **Hypothesis 3:** Fatigue significantly influences (a) COVID-19 fear, (b) COVID-19 stress, and (c) outbound travel intention.

Individuals with mental health issues are more prone to distress about health, social isolation, and meeting work and family obligations (Chang et al., 1997). Travellers may feel insecure when their environment changes, such as during an infectious disease outbreak (Xia et al., 2021). A healthy mental state can enhance travellers' psychological safety, given their confidence in facing external stimuli; they can travel without fear of repercussions (Kahn, 1990). Thus, people with poor mental status can highlight their fear and stress about COVID-19, inhibiting outbound travel intentions under uncertain conditions. The following hypothesis is thus put forth:

> **Hypothesis 4:** Mental status significantly influences (a) COVID-19 fear, (b) COVID-19 stress, and (c) outbound travel intention.

Regarding the immune system, people with SHS are prone to respiratory infections, are cold-intolerant, and often complain of a sore throat (Yan et al., 2009). The SARS-CoV-2 virus affects the immune system (Yazdanpanah & Rezaei, 2020) and immunocompromised

individuals are especially vulnerable to infection (Kumar et al., 2021). The immune system plays a vital role in the symptoms and severity of COVID-19 (Paces et al., 2020). Adaptive immune responses control the infection and determine recovery efficiency (Ahmadpoor & Rostaing, 2020). Consequently, we assume that the level of the immune system will affect COVID-19-related fear, stress, and travel decision-making. The following hypothesis is thus put forth:

> **Hypothesis 5:** Immune system status significantly influences (a) COVID-19 fear, (b) COVID-19 stress, and (c) outbound travel intention.

Individuals with SHS tend to have problems with their cardiovascular system (e.g. shortness of breath, chest congestion, heart palpitations) (Yan et al., 2009). Medical research has revealed a significant association between cardiac injury in COVID-19 patients and high mortality (Guzik et al., 2020) and cardiovascular damage results in a worse prognosis for these patients (Azevedo et al., 2021). Hypertension can increase inflammation and increased inflammation is suspected to result in a higher mortality risk for COVID-19 patients with hypertension than those without (Zuin et al., 2020). Previous research indicated that cardiovascular disease is also highly associated with stress and poor physical activity (Cohen et al., 2015). The following hypothesis is thus put forth:

> **Hypothesis 6:** Cardiovascular system health significantly influences (a) COVID-19 fear, (b) COVID-19 stress, and (c) outbound travel intention.

Digestive problems, such as poor appetite or indigestion, also accompany SHS (Yan et al., 2009). These symptoms frequently co-occur with depressive and panic disorders (Lee, 2020). Su et al. (2020) found that COVID-19 patients without digestive problems recovered more quickly than patients with digestive tract illnesses. As digestive complications often accompany COVID-19, digestive systems could presumably intensify COVID-19 fear and stress. The following hypothesis is thus put forth:

> **Hypothesis 7:** Digestive system health significantly influences (a) COVID-19 fear, (b) COVID-19 stress, and (c) outbound travel intention.

Leisure and life enjoyment

Cultural values refer to the beliefs people hold, both consciously and subconsciously (Schwartz & Bilsky, 1987). Empirical evidence has shown that cultural values are critical determinants of consumer and tourist behaviour (Henry, 1976). There are five main Chinese cultural values related to tourism (Huang & Wen, 2021). Specifically, LLE reflects modern Chinese consumers' contemporary pursuits of indulgence, fun, enjoyment, and a pleasant life. The filial piety and relationships dimension indicates a respect for one's parents and ancestors and a devotion to kinship influenced by Confucianism. Self-fulfilment is associated with self-enhancement, achievement, and life enrichment. Righteousness relates to living a morally good life, while humanity refers to a love of people. In this study, we focused on LLE because this value is related to leisure consumption: it is most strongly linked with tourism involvement among the five factors (Huang & Wen, 2021). Specifically, we propose the following:

> **Hypothesis 8:** Leisure and life enjoyment significantly increases outbound travel intention.

Life and leisure and enjoyment reflects consumers' hedonic pursuits that are tied to being free from worry (Huta, 2012). The quest for pleasure generates confidence (Loonen & Ivanova, 2016) that can reduce distress (Sergent et al., 2021). Therefore, leisure and enjoyment can mitigate fear (e.g. about COVID-19), with hedonism acting as a counterforce to anxiety about travelling during the pandemic. Travellers who hold the LLE value will likely care less about negative perceptions induced by a public health crisis. COVID-19 fear and stress should thus have weaker effects on travel intentions among people with strong LLE. Stated formally:

> **Hypothesis 9a:** Leisure and life enjoyment significantly moderates the relationship between COVID-19 fear and outbound travel intention.

> **Hypothesis 9b:** Leisure and life enjoyment significantly moderates the relationship between COVID-19 stress and outbound travel intention.

Moderating effects of traveller characteristics

Behavioural factors including travel frequency (high vs. low), travel preference (group vs. individual), trip length (long vs. short), and tourism expenditure (high vs. low) have been examined as potential moderators in tourism studies (e.g. Liu et al., 2015). It is deficient to ignore their effects on travellers' behaviours during a public health crisis. Sensitivity to risk varies before, during, and after social and economic crises among tourists with different expenditure patterns (Senbeto & Hon, 2020). People who prefer to travel in groups tend to emphasize safety and perceive more significant health-related risks in international travel versus those who prefer to travel alone (Tsang & Wong, 2021).

Frequent international travellers are also more likely to engage in biosecurity behaviours to prevent COVID-19 infection (Kim et al., 2021). Shorter trips are typically

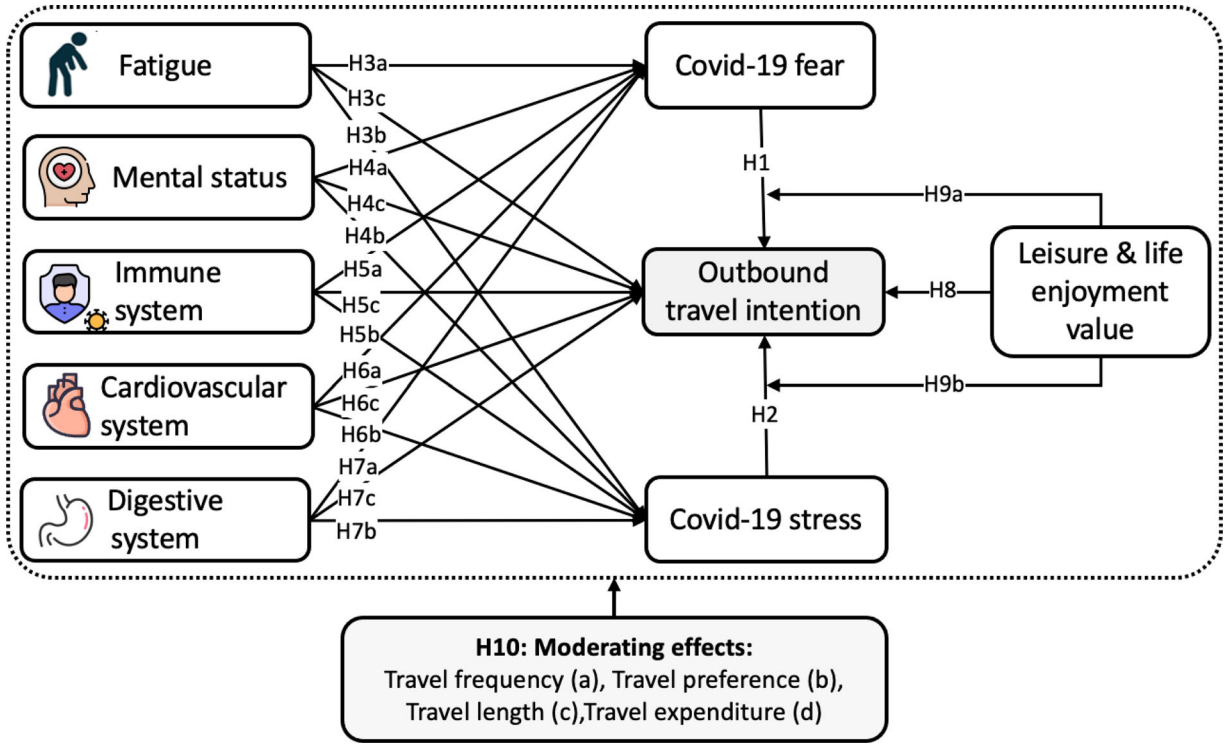

Figure 1. Proposed conceptual model.

associated with rapid travel that features time pressure and high stress in processing external stimuli, whereas longer trips allow for slower travel and less stress (Oh & Baloglu, 2016). No research appears to have yet analyzed how travellers with different behavioural patterns (i.e. in travel frequency, preference, length, and expenditure) vary in their fear, stress, and post-pandemic travel intentions. We postulate that traveller characteristics moderate the effects of SHS on COVID-19 stress, COVID-19 fear, and outbound travel intention:

> **Hypothesis 10:** (a) Travel frequency, (b) travel preference, (c) trip length, and (d) tourism expenditure significantly moderate the impacts of SHS on COVID-19 stress, COVID-19 fear, and outbound travel intention.

Figure 1 is a summary of literature review and then propose the model.

Methodology

Survey development

Measures for SHS, COVID-19 fear, COVID-19 stress, outbound travel intention, and LLE were drawn from the literature to ensure validity and reliability. The SHSQ-25, a self-report scale developed by Yan et al. (2009), was used to quantify SHS (a health status that is not yet clinically diagnosable) among respondents. The SHSQ-25 addresses fatigue (9 items), mental health (7 items), the cardiovascular system (3 items), the digestive system (3 items), and the immune system (3 items). SHSQ-25 items are measured on a 5-point scale (1 = *never or almost never*, 5 = *always*). Following recent COVID-19 studies (Reznik et al., 2021; Satici et al., 2021), we adopted a 7-item COVID-19 fear scale developed by Ahorsu et al. (2020). A 6-item stress scale (Mondo et al., 2021) and a 3-item travel intention scale (Chi et al., 2020) were also included. All constructs within these measures were scored on a 7-point scale (1 = *very strongly disagree*, 7 = *very strongly agree*). In addition, a 4-item LLE instrument (Huang & Wen, 2021) was scored on a 7-point scale ranging from 1 = *very unimportant* to 7 = *very important* (see details in Appendix 1).

To capture travellers' characteristics, respondents were asked to indicate their domestic and international travel frequency (8-point scale: 1 = *none*, 8 = *over 6 times*), preference (1 = *individual*, 2 = *group*), length (4-point scale: 1 = *1–2 days*, 4 = *over 14 days*), and expenditure (6-point scale: 1 = *below 1,000 yuan*, 6 = *above 20,000 yuan*) in the past 2 years. Respondents' sociodemographic information (e.g. gender, age, education, and income level) was also included in the survey. The original instruments were written in English. A back-translation approach was adopted to ensure semantic equivalence (Behling & Law, 2000). Further, a pilot test was conducted with 30 respondents to verify the survey's reliability and validity.

Data collection

The survey was administered to residents of Beijing, China, in January – February 2022 using convenience sampling through a market research company based in Beijing. The data collection agreement between the researchers and the data collection officer stipulated that data would be gathered via the company's customer relationship management database to guarantee sociodemographic diversity. Potential target respondents were required to confirm they had travelled domestically in the past two years (i.e. since the emergence of COVID-19 in 2019).

The survey was administered online through the market research company's data collection platform. Potential respondents were sent a unique survey link inviting them to complete the survey within a week. Respondents who submitted useable questionnaires were nominally compensated. Among the 1500 survey links sent, 928 surveys were returned (response rate: 61.87%). After deleting incomplete and rapid responses (i.e. surveys completed in less than 5 min), 800 surveys were retained for analysis.

The sample consisted of 51.25% men and 48.75% women. In terms of age, respondents were 25–34 years (381 respondents, 47.63%), 35–49 years (202 respondents, 25.25%), and 18–24 years (201 respondents, 25.13%). Most had a college or university education (26.25% and 49.13%, respectively). More than half (60.75%) of respondents earned a monthly income between 5,001 and 1,1000 yuan. Following the SHSQ-25 criteria (Yan et al., 2012), 439 respondents (54.88%) were identified as having SHS ($SHS_{score} \geq 35$), while 361 respondents (45.12%) were classified as having optimal health (OPH) ($SHS_{score} < 35$) (Table 1).

Data analysis

We used SPSS (v23) to examine common method bias and to generate descriptive statistics. The proposed research model was tested using partial least squares structural equation modelling (PLS-SEM) in Smart PLS (v 4.0.8). We first assessed the constructs' reliability, convergent validity, and discriminant validity. Second, structural relationships were evaluated using the PLS algorithm and PLS bootstrapping (5,000 sub-samples). Third, independent sample *t*-tests and multi-group analysis (MGA) were conducted to identify the moderating effects of travellers' characteristics, including travel frequency (high vs. low), preference (group vs. individual), length (long vs. short), and expenditure (high vs. low).

Results

Measurement model

Common method bias was examined using Harman's single-factor test and non-response bias test (Podsakoff et al., 2003). Principal component analysis revealed that the first factor explained 24.34% of the model's variance, below the desired 50% cut-off (Harman, 1976). A *t*-test revealed no statistical difference between the respondents of early (i.e. top 5%) and late (i.e. bottom 5%), indicating that common method bias was not an issue.

The measurement model was evaluated by determining constructs' and survey items' multicollinearity, reliability, and validity (Tables 2 and 3, Appendix 2). Most outer loadings were above 0.7; the lowest value was 0.5, above the ideal threshold of 0.4 (Hair, 2010). Outer variance inflation factor values were lower than 5 (between 1.000 and 4.671). Multicollinearity was, therefore, not a concern (Hair et al., 2016). The lowest Cronbach's α was 0.83, exceeding the minimum threshold of 0.7 and indicating sound reliability (Cronbach, 1951). Composite reliability (CR) values were between 0.83 and 0.96, higher than the recommended criterion of 0.7 (Hair et al., 2016).

Table 1. Profile of respondents.

Characteristics	Frequency	Percent	Characteristics	Frequency	Percent
Gender			Level of income		
Male	410	51.25	Below ¥5,000	93	11.63
Female	390	48.75	¥5,001-8,000	238	29.75
Age			¥8,001-11,000	248	31.00
18–24	201	25.13	¥11,001-14,000	132	16.50
25–34	381	47.63	¥14,001 or above	89	11.13
35–49	202	25.25	Suboptimal health status		
50 or above	16	2.00	SHS Group	439	54.88
Education			OPH group	361	45.12
Junior Primary School	33	4.13			
High School	120	15.00			
College	210	26.25			
University	393	49.13			
Master or above	44	5.50			
Total	800				

Discriminant validity was checked using the heterotrait – monotrait ratio of correlations (HTMT). Inter-factor HTMT values ranged between 0.019 and 0.719, lower than the 0.85 cut-offs (Henseler et al., 2015). Most average variance extracted (AVE) values were above 0.5. One construct (i.e. fatigue) was 0.48, which was close enough to 0.5 to be acceptable (Marire et al., 2017). All square roots of AVE values exceeded the constructs' correlation matrices and all correlation values were below the cut-off of 0.7, further confirming discriminant validity (Fornell & Larcker, 1981). Additionally, the potential existence of endogeneity was assessed using the Gaussian copula approach (Hult et al., 2018). The Gaussian copula terms of all the coefficients were insignificant (i.e. $p > 0.05$), indicating that endogeneity was not a concern in this study.

Table 2. Measurement items.

	Mean	SD	Factor Loading	Cronbach's α
Suboptimal health status				
Fatigue				0.87
FA1	2.86	0.84	0.75	
FA2	2.55	0.85	0.67	
FA3	2.88	0.68	0.69	
FA4	2.37	0.79	0.68	
FA5	2.28	0.77	0.66	
FA6	2.89	0.86	0.67	
FA7	2.40	0.97	0.70	
FA8	2.97	0.91	0.68	
FA9	2.27	0.88	0.73	
Mental status				0.86
MS1	2.56	1.02	0.53	
MS2	2.43	1.03	0.60	
MS3	2.42	1.01	0.76	
MS4	2.38	0.95	0.80	
MS5	2.63	0.91	0.80	
MS6	2.69	0.99	0.82	
MS7	2.79	0.96	0.83	
Immune system				0.70
IS1	2.24	0.78	0.80	
IS2	2.31	0.88	0.85	
IS3	2.47	0.72	0.73	
Cardiovascular system				0.88
CS1	1.99	0.84	0.88	
CS2	1.92	0.83	0.93	
CS3	1.78	0.82	0.89	
Digestive system				0.72
DS1	1.95	0.82	0.70	
DS2	2.33	0.89	0.84	
DS3	2.31	0.87	0.86	
COVID-19 fear				0.90
FEA1	4.24	1.55	0.74	
FEA2	4.07	1.47	0.81	
FEA3	3.05	1.29	0.83	
FEA4	4.14	1.70	0.77	
FEA5	3.72	1.44	0.87	
FEA6	2.75	1.37	0.76	
FEA7	2.87	1.43	0.77	
COVID-19 stress				0.91
STR1	4.27	1.47	0.77	
STR2	4.03	1.39	0.86	
STR3	4.38	1.38	0.86	
STR4	3.93	1.34	0.86	
STR5	4.28	1.40	0.82	
STR6	3.63	1.35	0.82	
Outbound travel intention				0.96
OTI1	3.35	1.59	0.95	
OTI2	3.16	1.57	0.96	
OTI3	3.14	1.57	0.96	
Leisure & life enjoyment value				0.75
LLE1	5.32	1.05	0.50	
LLE2	5.43	1.10	0.76	
LLE3	5.57	1.11	0.87	
LLE4	5.70	1.05	0.87	

Note. Detailed items were presented in Appendix 1.

Structural model

The proposed hypotheses were investigated based on the coefficient of determination (R^2), path coefficients (β), and *p*-values (Table 4, Figure 2). The standardized root mean residual (SRMR) was 0.049, indicating an accep le model fit (< 0.08 criterion) (Henseler et al., 2015). The model explained 29.1% of the variance in COVID-19 stress ($R^2 = 0.291$), 7.8% in fear ($R^2 = 0.078$), and 5.1% in outbound travel intention ($R^2 = 0.051$). Outbound travel intention was negatively associated with COVID-19 stress ($\beta = -0.1$, $p < 0.05$) but not with COVID-19 fear ($\beta = -0.03$, $p = 0.455$), supporting H2. Fatigue had a significant negative impact on COVID-19 fear ($\beta = -0.15$, $p < 0.01$) but had positive effects on COVID-19 stress ($\beta = 0.13$, $p < 0.01$) and outbound travel intention ($\beta = 0.19$, $p < 0.01$). As such, H1a, H1b, and H1c were supported. Mental health had strong positive influences on COVID-19 fear ($\beta = 0.20$, $p < 0.001$) and COVID-19 stress ($\beta = 0.40$, $p < 0.001$), yet had no significant impact on outbound travel intention ($\beta = -0.04$, $p = 0.421$). Therefore, H2a and H2c were supported, while H2c was rejected. The immune system partially increased COVID-19 fear ($\beta = 0.08$, $p < 0.05$) and COVID-19 stress ($\beta = 0.07$, $p < 0.01$), confirming H5a and H5c. The cardiovascular system was positively related to COVID-19 fear ($\beta = 0.13$, $p < 0.01$) but was not significantly associated with COVID-19 stress ($\beta = 0.14$, $p = 0.272$) or outbound travel intention ($\beta = -0.07$, $p = 0.129$), supporting H3a. The digestive system had no significant effect on COVID-19 fear ($\beta = 0.06$, $p = 0.154$), outbound travel intention ($\beta = 0.07$, $p = 0.123$), or COVID-19 stress ($\beta = -0.04$, $p = 0.273$); therefore, H4a, H4b, and H4c were not supported. H8 was confirmed, given the positive relationship between outbound travel intention and LLE ($\beta = 0.13$, $p < 0.001$). PLS bootstrapping was used to test the moderating effects of LLE. The interaction effects of LLE and COVID-19 fear ($\beta = 0.04$, $p = 0.345$) and of LLE and COVID-19 stress ($\beta = -0.03$, $p = 0.535$) on outbound travel intention were not significant. Thus, H9a and H9b were rejected.

Multi-group analysis

Travel frequency, preference, length, and expenditure were converted to categorical variables by a median

Table 3. Composite reliability, average variance extracted, and square root of AVE.

	CR	AVE	1	2	3	4	5	6	7	8	9
1. Fatigue	0.89	0.48	**0.703**								
2. Mental status	0.9	0.55	0.677	**0.744**							
3. Immune system	0.83	0.63	0.437	0.419	**0.791**						
4. Cardiovascular system	0.93	0.81	0.615	0.517	0.327	**0.901**					
5. Digestive system	0.84	0.65	0.484	0.457	0.399	0.478	**0.803**				
6. COVID-19 fear	0.92	0.63	0.135	0.231	0.169	0.2	0.179	**0.792**			
7. COVID-19 stress	0.93	0.69	0.439	0.522	0.293	0.333	0.256	0.323	**0.832**		
8. Outbound travel intention	0.97	0.92	0.105	0.018	−0.002	0.012	0.065	−0.048	−0.059	**0.96**	
9. Leisure & life enjoyment value	0.84	0.58	0.14	0.096	0.018	0.042	0.016	0.024	0.071	0.145	**0.764**

Note. CR = Composite Reliability; AVE = Average Variance Extracted. Square root of AVE in bold on diagonal.

split (Tran et al., 2021). A series of *t*-tests were conducted to detect differences in travellers' SHS, COVID-19 fear, COVID-19 stress, outbound travel intentions, and LLE between groups in terms of travel frequency (high vs. low), preference (group vs. individual), length (long vs. short), and expenditure (high vs. low). Significant differences were identified in all groups. Specifically, frequent travellers showed more prevalent fatigue ($M_{high} = 2.68$, $M_{alow} = 2.55$, $p < 0.01$), mental status concerns ($M_{high} = 2.63$, $M_{alow} = 2.50$, $p < 0.01$), cardiovascular symptoms ($M_{high} = 1.97$, $M_{alow} = 1.85$, $p < 0.05$), and digestive symptoms ($M_{high} = 2.29$, $M_{alow} = 2.12$, $p < 0.001$). High-frequency and long-term travellers also expressed stronger outbound travel intentions ($M_{high} = 3{,}63$, $M_{alow} = 2.85$, $p < 0.001$; $_{Along} = 3.30$, $_{Short} = 3.07$, $p < 0.001$) and greater LLE ($M_{high} = 5.56$, $M_{alow} = 5.42$, $p < 0.05$; $_{Along} = 3{,}63$, $_{Short} = 2.85$, $p < 0.05$) than low-frequency and short-term travellers. Respondents who preferred to travel in groups demonstrated lower outbound travel intentions than individual travellers ($_{Group} = 3.04$, $_{Individual} = 3.35$, $p < 0.01$). Travellers who spent more on travel also reported more significant fatigue ($M_{high} = 2.65$, $M_{alow} = 2.56$, $p < 0.05$), higher travel intentions ($M_{high} = 3.57$, $M_{alow} = 2.85$, $p < 0.001$), and greater LLE ($M_{high} = 5.58$, $M_{alow} = 5.42$, $p < 0.01$).

Table 4. Structural model assessment.

Hypotheses		β	*p*-value	SE	
H1	COVID-19 fear → Outbound travel intention	−0.03	0.455	0.04	N
H2	COVID-19 stress→ Outbound travel intention	−0.10	*	0.05	S
H3a	Fatigue→ COVID-19 fear	−0.15	**	0.06	S
H3b	Fatigue→ COVID-19 stress	0.13	**	0.05	S
H3c	Fatigue→ Outbound travel intention	0.19	**	0.06	S
H4a	Mental status → COVID-19 fear	0.20	***	0.05	S
H4b	Mental status → COVID-19 stress	0.40	***	0.04	S
H4c	Mental status → Outbound travel intention	−0.04	0.421	0.05	N
H5a	Immune system → COVID-19 fear	0.08	*	0.04	S
H5b	Immune system → COVID-19 stress	0.07	*	0.04	S
H5c	Immune system → Outbound travel intention	−0.04	0.367	0.04	N
H6a	Cardiovascular system→ COVID-19 fear	0.13	**	0.05	S
H6b	Cardiovascular system→ COVID-19 stress	0.04	0.272	0.04	N
H6c	Cardiovascular system→ Outbound travel intention	−0.07	0.129	0.05	N
H7a	Digestive system → COVID-19 fear	0.06	0.154	0.04	N
H7b	Digestive system → COVID-19 stress	−0.04	0.273	0.04	N
H7c	Digestive system → Outbound travel intention	0.07	0.123	0.05	N
H8	LLE → Outbound travel intention	0.13	***	0.04	S
H9a	COVID-19 fear×LLE→ Outbound travel intention	0.04	0.345	0.04	N
H9b	COVID-19 stress×LLE→ Cautious travel	−0.03	0.535	0.04	N

Note. SRMR = 0.049. β = Standardized Regression Weight. SE = Standardized Error. LLE = Leisure and life enjoyment value. ***$p < 0.001$. **$p < 0.01$. S = Support. N = Not support.

We investigated the moderating effects of travellers' characteristics via multi-group permutation tests. Following Henseler et al.'s (2015) recommendation, the three-step measurement invariance of composites approach was used to evaluate measurement invariance. Group differences were established after assessing configural invariance, compositional invariance, and equal means and variances. The MGA results indicated that the effect of fatigue on COVID-19 stress was stronger among high-frequency travellers than among low-frequency travellers ($\beta_{high} = 0.25$ vs. $\beta_{low} = 0.07$, $p < 0.05$). Mental health symptoms inhibited high-frequency travellers' outbound travel intentions but triggered such intentions among low-frequency travellers ($\beta_{high} = -0.17$ vs. $\beta_{low} = 0.04$, $p < 0.05$). The positive impact of mental health on COVID-19 fear was much more substantial among respondents who preferred to travel in groups ($\beta_{group} = 0.33$ vs. $\beta_{individual} = 0.10$, $p < 0.01$); however, the positive effect of immune system symptoms on COVID-19 fear was stronger among individual travellers than among group travellers ($\beta_{group} = 0.04$ vs. $\beta_{individual} = 0.20$, $p < 0.01$). Additionally, the relationship between cardiovascular symptoms and COVID-19 stress was positive among high-expenditure travellers but negative among low-expenditure travellers ($\beta_{high} = 0.12$ vs. $\beta_{low} = -0.05$, $p < 0.05$) (see details in Appendix 3).

Discussion and implications

As a risk factor for chronic disease (Wang et al., 2016), SHS is globally pervasive. It creates functional

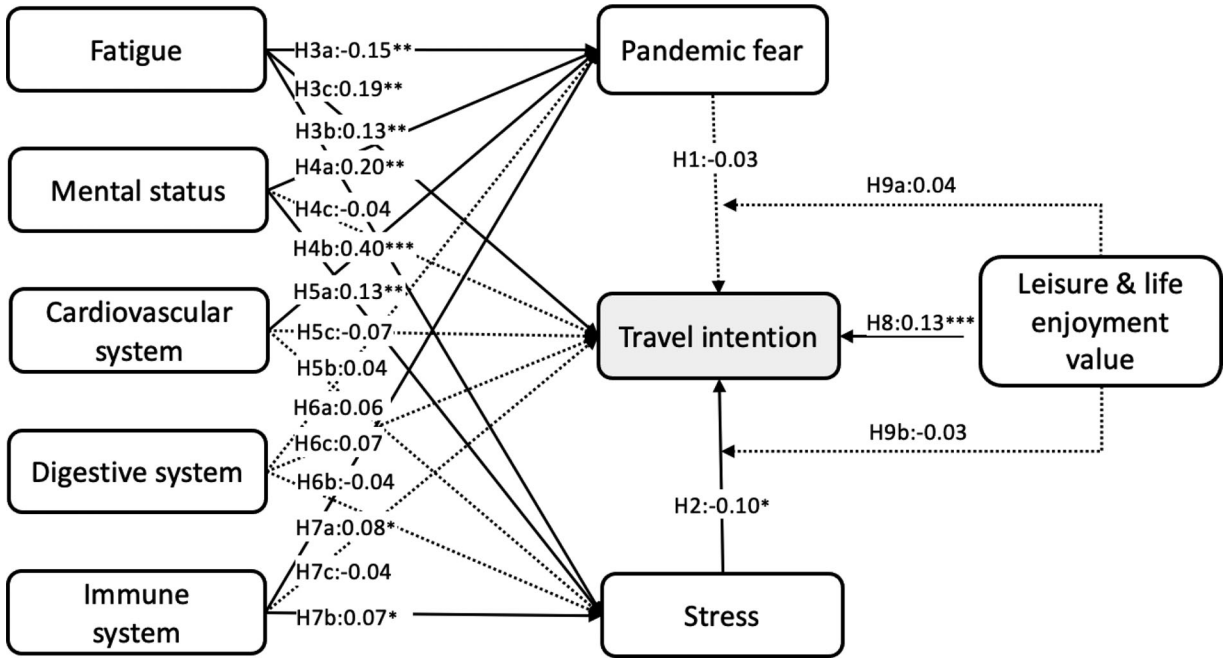

Figure 2. The estimated structural model.
Note. SRMR = 0.061. ***p < 0.001. **p < 0.01.

imbalances and impairs environmental adaptation (Wang et al., 2021). The threat of SHS has become more overt since the COVID-19 outbreak, as people with SHS may be especially susceptible to the virus (Kumar et al., 2021). Scholars have dissected the link between travellers' health and behaviours (Kim et al., 2021; Smith & Diekmann, 2017); however, SHS and its travel implications have not been considered in tourism or public health. This interdisciplinary study examined relationships between SHS, COVID-19 fear and stress, and post-pandemic outbound travel intention. The Chinese cultural value of LLE and travel-related characteristics were included to address possible moderating effects. Findings offer theoretical contributions on several fronts.

Theoretical contributions

This study is one of the first to investigate the impacts of SHS on travellers' psychology and behavioural intentions following the COVID-19 outbreak. Prior work on SHS primarily concerned the condition's antecedents and consequences from a medical science perspective (e.g. Anto et al., 2020; Wang et al., 2021; Xu et al., 2020) while overlooking its effects on travellers' pandemic-induced reactions (e.g. fear, stress) and travel intentions. Our results add to the literature by revealing that COVID-19 fear was stronger among travellers with less fatigue, more mental health symptoms, and more immune system symptoms. Likewise, travellers experienced more COVID-19 stress if they had more fatigue, mental health symptoms, and immune system symptoms.

Consistent with medical science research on the detrimental effects of SHS on personal wellbeing (Kumar et al., 2021; Overman et al., 2016; Roberts, 2019), these findings advance our understanding of how travellers respond cognitively and emotionally to a public health crisis (Agyeiwaah et al., 2021; Matiza & Kruger, 2021; Zheng et al., 2022). Other SHS symptoms had no significant influence on outbound travel intention; however, travellers with more fatigue were more inclined to travel. This outcome reflects earlier tourism research regarding how tourists' health influences travel behaviour (Karl et al., 2020). This finding further highlights the role of fatigue in altering travel decisions. Beyond recognizing psychological aspects that have motivated or discouraged travel following the COVID-19 outbreak (Zheng et al., 2022), this study takes a broader view by incorporating health status. SHS offers a fresh look at travellers' behaviours in a post-pandemic world.

Additionally, several novel findings emerged regarding the antecedents of post-pandemic travel intention. This study contributes to the transactional stress model (Lazarus & Folkman, 1984) by testing the impact of perceived stress during the COVID-19 pandemic on travel intention. Results provide initial insight into how travellers' perceived stress affects post-pandemic travel behaviour. Transactional theory suggests that people deploy

coping strategies in response to stressors (Iwasaki & Schneider, 2003; Lazarus & Folkman, 1984). Our study indicated that individuals might limit travel to mitigate COVID-19 stressors: a negative association was identified between COVID-19 stress and outbound travel intention.

Conversely, the negative relationship between COVID-19 fear and outbound travel intention was not supported. This finding contradicts Zheng et al. (2022), who detected a positive impact of COVID-19 fear on post-pandemic travel avoidance. The insignificant result may have arisen because COVID-19 is globally pervasive: even if people fear the virus, pandemic risk in one's hometown and an overseas destination may not vary significantly. Therefore, outbound travel intention may not decline simply because of fear.

Further, given the importance of cultural values in shaping travel behaviour, this study enriches the understanding of travel-related cultural values by examining the influence of LLE on outbound travel intention. Findings extend the work of Huang and Wen (2021) by showing that LLE is positively related to outbound travel intention in post-pandemic times.

Limited market segmentation analysis has weakened the overall comprehension of travel behaviour (Jiang & Chen, 2019).

The current research suggested differences in travellers' SHS, cultural values, and intentions for travel overseas in the post-COVID-19 period based on travel patterns. MGA demonstrated that people who travel more frequently are more fatigued and have more mental, cardiovascular, and digestive symptoms. In contrast, people who spend more on travel have more fatigue. These findings add to the literature on SHS (Wang et al., 2021) and reinforce the need to explore the link between travel behaviour and SHS.

Frequent travellers and those who spend more on travel were also found to have higher LLE and stronger outbound travel intentions. In comparison, people who preferred to travel in groups displayed lower outbound travel intentions than those who preferred to travel alone. Although outbound travel is risky during COVID-19, people who favour independent trips enjoy using adventures to showcase their identity (Elrod, 2001). This finding is also consistent with Ivanova et al.'s (2021) discovery that Bulgarians' first post-pandemic trips were domestic and with family. Furthermore, these results contextualized how behavioural factors influence travellers' actions during a public health crisis (Kim et al., 2021; Senbeto & Hon, 2020). In line with research on slow and fast travel (Oh & Baloglu, 2016), our findings indicated that people who travel for more extended periods pursue LLE and are more likely to engage in outbound travel post-COVID-19.

This study also uncovered the moderating effects of behavioural travel patterns on the impacts of SHS on COVID-19 fear, stress, and outbound travel intention. The positive role of fatigue in COVID-19 stress was more substantial among those who travelled more frequently; that is, fatigue appeared likely to increase COVID-19 stress in frequent travellers. High-frequency travel also diminished outbound travel intentions among people with mental concerns, whereas the opposite was true for individuals who travelled less frequently. Likewise, high-expenditure travellers experienced more significant COVID-19 stress due to cardiovascular symptoms, whereas such stress was lower among more conservative spenders. This finding aligns with results from Senbeto and Hon (2020), showing that tourists' expenditure patterns might affect their risk sensitivity.

The positive role of mental status on COVID-19 fear was more substantial among people who preferred to travel in groups, while the positive impact of immune system symptoms on COVID-19 fear was weaker. This outcome is in line with Tsang and Wong's (2021) observation that people who prefer to travel in groups are more apt to focus on safety and significant health concerns; however, no significant difference was identified in these relationships between long- and short-term travellers. These results provide empirical evidence on the moderating roles of behavioural factors in travel (Liu et al., 2015). This study also bolsters knowledge (Zheng et al., 2022) of post-pandemic travel concerning sociodemographic attributes such as gender, age, income, and geographic location.

Practical implications

The COVID-19 pandemic has amplified individuals' health consciousness. The current study drew attention to SHS, a growing health concern worldwide. Results revealed the roles of SHS in travellers' fear and perceived stress amid the pandemic. Policymakers and tourism authorities are advised to frame wellness and holistic health as post-pandemic tourism development initiatives to promote physiological and psychological well-being through travel. Tourism agencies and destinations should cater to travellers with SHS, who likely constitute a sizable proportion of all travellers, given the prevalence of this condition. Agencies can design tourism products to help travellers adopt a healthy lifestyle (e.g. a healthy diet, vitality, stress reduction, and proactive defenses against illness). Destination marketing organizations should highlight their strategic positioning related to SHS. For instance, apart from their natural beauty, nature-based tourism

destinations can emphasize that forests and beaches enable tourists to relax.

COVID-19-induced stress has been found to decrease travellers' outbound travel intentions. It is thus essential to reduce COVID-19 stressors. Governments, tourism authorities, and destinations need to publicize illness prevention and control through official websites, social media, and travel agencies. Travellers will then know what to expect at the destination and can prepare accordingly to minimize stress. Our research further demonstrated that LLE positively influences outbound travel intention. As China is the world's largest outbound tourism market, industry practitioners are advised to integrate LLE characteristics in tourism experience design.

Findings also showed that travellers' psychology and behaviour vary during public health crises on the bases of travel frequency (high vs. low), preferences (group vs. individual), length (long vs. short), and expenditure (high vs. low). In this study, people who preferred to travel in groups exhibited lower outbound travel intentions than those who preferred to travel individually. We also found that cardiovascular problems would likely increase high-expenditure travellers' perceived stress. Tourism service providers should offer cardiovascular-health-focused amenities to help these tourists travel without worry.

Limitations and future research

Several limitations of this study open avenues for future research. First, we used online surveys to collect cross-sectional data. Subsequent work should include qualitative methods to explore travellers' motivations, expectations, and feelings with SHS via in-depth interviews or focus group discussions. A longitudinal approach could unveil a causal link between SHS and actual outbound travel after the pandemic.

Second, data were gathered from respondents in Beijing; findings may not be generalizable because Beijing is China's capital and one of its most developed cities. Future research on Chinese populations can involve quota sampling to obtain data from regions affected by COVID-19, covering urban and rural residents.

Third, although this study empirically documented the Chinese cultural value of LLE as a predictor of post-pandemic travel intention, this outcome may not apply in countries with different cultures. This study should be replicated in a Western context to test the impacts of Western cultural values on post-pandemic travel behaviour.

Fourth, concerning COVID-19 fear, stress, and outbound travel intention, SHS was considered. Researchers should continue performing interdisciplinary work (e.g. Wen et al., 2021) on the associations between tourism activities and other health conditions, such as dementia.

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Appendices

Appendix 1. Measurement item descriptions

Fatigue*	
FA1	exhausted without increasing physical activity
FA2	fatigue could not be substantially alleviated by rest
FA3	lethargic when working
FA4	suffered from headaches
FA5	suffered from dizziness
FA6	eyes ached or were tired
FA7	muscles or joints felt stiff
FA8	have pain in your shoulder/neck/waist
FA9	have a heavy feeling in your legs when walking
Mental status*	
MS1	had difficulty falling asleep
MS2	had trouble with waking up during the night
MS3	had trouble with your short-term memory
MS4	could not respond quickly
MS5	had difficulty concentrating
MS6	were distracted for no reason
MS7	felt nervous or jittery
Immune system*	
IS1	suffered from a sore throat
IS2	could not tolerate the cold
IS3	caught a cold in the past 3 months
Cardiovascular system*	
CS1	feel out of breath while sitting still
CS2	suffered from chest congestion
CS3	were bothered by heart palpitations
Digestive system*	
DS1	appetite is poor
DS2	suffered from heartburn
DS3	suffered from nausea
COVID-19 fear**	
FEA1	I am most afraid of COVID-19.
FEA2	It makes me uncomfortable to think about COVID-19.
FEA3	My hands become clammy when I think about COVID-19.
FEA4	I am afraid of losing my life because of COVID-19.
FEA5	I become nervous or anxious when watching news and stories about COVID-19 on social media.
FEA6	I cannot sleep because I'm worrying about getting COVID-19.
FEA7	My heart races or palpitates when I think about getting COVID-19.
COVID-19 stress**	
STR1	upset because of something that happened unexpectedly during the COVID-19
STR2	unable to control the important things in your life during the COVID-19
STR3	nervous and "stressed" during the COVID-19
STR4	could not cope with all the things that you had to do during the COVID-19
STR5	angered because of things that were outside your control during the COVID-19
STR6	difficulties were piling up so high that you could not overcome them during the COVID-19
Outbound travel intention**	
OTI1	will travel overseas as soon as outbound travel is allowed
OTI2	plan to travel overseas as soon as outbound travel is allowed
OTI3	would like to travel overseas as soon as outbound travel is allowed
Leisure & life enjoyment value***	
LLE1	having fun and enjoyment
LLE2	easy and comfortable
LLE3	indulgence
LLE4	leisure

Note. * Variables were evaluated from "never or almost never" (1), "rarely" (2), "sometimes" (3), "very often" (4), "always" (5). ** Variables were evaluated from "very strongly disagree" (1), "strong disagree" (2), "disagree" (3), "neutral" (4), "agree" (5), "strong agree" (6), "very strong agree" (7). *** Variables were evaluated from "very unimportant" (1), "unimportant" (2), "slightly unimportant" (3), "neutral" (4), "slightly important" (5), "important" (6), "very s important" (7).

Appendix 2. Questionnaire

1. Suboptimal Health Status Questionnaire-25 (SHSQ-25)

How often is it, that you (your)	1 *never or almost never*	2 *occasionally*	3 *often*	4 *very often*	5 *always*
	1	2	3	4	5
1. were exhausted without greatly increasing your physical activity.	☐	☐	☐	☐	☐
2. fatigue could not be substantially alleviated by rest.	☐	☐	☐	☐	☐
3. were lethargic when working.	☐	☐	☐	☐	☐
4. suffered from headaches.	☐	☐	☐	☐	☐
5. suffered from dizziness.	☐	☐	☐	☐	☐
6. eyes ached or were tired.	☐	☐	☐	☐	☐
7. suffered from a sore throat.	☐	☐	☐	☐	☐
8. muscles or joints felt stiff.	☐	☐	☐	☐	☐
9. have pain in your shoulder/neck/waist.	☐	☐	☐	☐	☐
10. have a heavy feeling in your legs when walking.	☐	☐	☐	☐	☐
11. feel out of breath while sitting still.	☐	☐	☐	☐	☐
12. suffered from chest congestion.	☐	☐	☐	☐	☐
13. were bothered by heart palpitations.	☐	☐	☐	☐	☐
14. appetite is poor.	☐	☐	☐	☐	☐
15. suffered from heartburn.	☐	☐	☐	☐	☐
16. suffered from nausea.	☐	☐	☐	☐	☐
17. could not tolerate the cold.	☐	☐	☐	☐	☐
18. had difficulty falling asleep.	☐	☐	☐	☐	☐
19. had trouble with waking up during night.	☐	☐	☐	☐	☐
20. had trouble with your short-term memory.	☐	☐	☐	☐	☐
21. could not respond quickly.	☐	☐	☐	☐	☐
22. had difficulty concentrating.	☐	☐	☐	☐	☐
23. were distracted for no reason.	☐	☐	☐	☐	☐
24. felt nervous or jittery.	☐	☐	☐	☐	☐
25. caught a cold in the past 3 months	☐	☐	☐	☐	☐

(*Continued*)

2. COVID-19 fear

	1 *very strongly disagree*	2 *strongly disagree*	3 *disagree*	4 *neutral*	5 *agree*	6 *strongly agree*	7 *very strongly agree*
Please answer the questions below based on your own perspective	1	2	3	4	5	6	7
1. I am most afraid of coronavirus-19	☐	☐	☐	☐	☐	☐	☐
2. It makes me uncomfortable to think about coronavirus-19	☐	☐	☐	☐	☐	☐	☐
3. My hands become clammy when I think about coronavirus-19	☐	☐	☐	☐	☐	☐	☐
4. I am afraid of losing my life because of coronavirus-19	☐	☐	☐	☐	☐	☐	☐
5. When watching news and stories about coronavirus-19 on social media, I become nervous	☐	☐	☐	☐	☐	☐	☐
6. I cannot sleep because I'm worrying about getting coronavirus-19	☐	☐	☐	☐	☐	☐	☐
7. My heart races or palpitates when I think about getting coronavirus-19	☐	☐	☐	☐	☐	☐	☐

3. COVID-19 stress

	1 *very strongly disagree*	2 *strongly disagree*	3 *disagree*	4 *neutral*	5 *agree*	6 *strongly agree*	7 *very strongly agree*
In the last month, have you been frequently feel	1	2	3	4	5	6	7
1. Upset because of something that happened unexpectedly	☐	☐	☐	☐	☐	☐	☐
2. Unable to control the important things in your life	☐	☐	☐	☐	☐	☐	☐
3. Nervous and "stressed"	☐	☐	☐	☐	☐	☐	☐
4. Could not cope with all the things that you had to do	☐	☐	☐	☐	☐	☐	☐
5. Angered because of things that were outside your control?	☐	☐	☐	☐	☐	☐	☐
6. Difficulties were piling up so high that you could not overcome them?	☐	☐	☐	☐	☐	☐	☐

4. Outbound travel intention

	1 *very strongly disagree*	2 *strongly disagree*	3 *disagree*	4 *neutral*	5 *agree*	6 *strongly agree*	7 *very strongly agree*
Please rate your travel intention as follows:	1	2	3	4	5	6	7
1. I will travel overseas as soon as international travel is allowed	☐	☐	☐	☐	☐	☐	☐
2. I plan to travel overseas as soon as international travel is allowed	☐	☐	☐	☐	☐	☐	☐
3. I would like to travel overseas as soon as international travel is allowed	☐	☐	☐	☐	☐	☐	☐

5. Leisure & life enjoyment value

	1 *very unimportant*	2 *unimportant*	3 *slightly unimportant*	4 *neutral*	5 *slightly Important*	6 *important*	7 *very important*
Please rate the importance of these items thinking yourself as a tourist	1	2	3	4	5	6	7
1. Having fun and enjoyment	☐	☐	☐	☐	☐	☐	☐
2. Easy and comfortable	☐	☐	☐	☐	☐	☐	☐
3. Indulgence	☐	☐	☐	☐	☐	☐	☐
4. Leisure	☐	☐	☐	☐	☐	☐	☐

6. Tourist Characteristics

1) In the past two years, how often did you travel domestically each year?
☐ none ☐ 1 time ☐ 2 times ☐ 3 times ☐ 4 times ☐ 5 times ☐ 6 times ☐ > 6 times
2) In the past two years, how often did you travel abroad every year?
☐ none ☐ 1 time ☐ 2 times ☐ 3 times ☐ 4 times ☐ 5 times ☐ 6 times ☐ > 6 times
3) What is your travel preferences?
☐ Travel alone ☐ Travel with a group
4) For domestic travel, how long is your approximate travel length?
☐ 1-2 days ☐ 3-7 days ☐ 7-14 days ☐ > 14 days
5) For international travel, how long is your approximate travel length?
☐ 1-2 days ☐ 3-7 days ☐ 7-14 days ☐ > 14 days
6) What was the general cost of your trip (CNY)?
☐ <1,000 ☐ 1,001-5,000 ☐ 5,001-10,000 ☐ 10,001-15,000 ☐ 15,001-20,000 ☐ >20,000
7) Gender: ☐ Male ☐ Female
8) Age: _____(Years)
9) What is the highest level of education you have completed?
☐ Middle school or below ☐ College/University ☐ Master or above
10) Personal monthly income (CNY).
☐ ≤ 5,000 ☐ 5,001-8,000 ☐ 8,001 -11,000 ☐ >11,000

Appendix 3. Multi-group analysis

	Travel frequency				Travel preference				Travel length				Travel expenditure			
	High n=349	Low n=451			Group n=404	Individual n=396			Long n=423	Short n=377			High n=382	Low n=418		
	β	β	diff	*p*-value	β	β	diff	*p*-value	β	β	diff	*p*-value	β	β	diff	*p*-value
Fear→OTI	-0.06	0.01	-0.07	0.41	0.00	-0.05	0.05	0.56	-0.01	-0.07	0.06	0.48	-0.05	0.00	-0.04	0.62
Stress→OTI	-0.11	-0.06	-0.05	0.63	-0.11	-0.11	0.00	1.00	-0.10	-0.06	-0.03	0.78	-0.05	-0.12	0.07	0.49
Fatigue→Fear	-0.13	-0.14	0.00	0.98	-0.22	-0.10	-0.12	0.29	-0.22	-0.07	-0.15	0.16	-0.21	-0.11	-0.10	0.41
Fatigue→Stress	0.25	0.07	0.18	*	0.08	0.18	-0.10	0.29	0.13	0.12	0.01	0.88	0.17	0.12	0.05	0.62
Fatigue→OTI	0.19	0.17	0.02	0.86	0.13	0.25	-0.12	0.32	0.20	0.23	-0.04	0.76	0.13	0.21	-0.08	0.53
Mental→Fear	0.19	0.19	0.00	1.00	0.33	0.10	0.22	**	0.23	0.19	0.05	0.65	0.22	0.19	0.03	0.74
Mental→Stress	0.34	0.44	-0.10	0.28	0.45	0.35	0.10	0.22	0.40	0.40	0.00	0.96	0.38	0.40	-0.02	0.81
Mental→ OTI	-0.17	0.04	-0.20	*	-0.01	-0.06	0.05	0.66	-0.11	0.01	-0.12	0.27	-0.04	-0.03	-0.01	0.91
Immune→Fear	0.11	0.05	0.06	0.53	0.04	0.20	-0.16	*	0.13	0.03	0.11	0.20	0.12	0.06	0.05	0.55
Immune→Stress	0.08	0.05	0.02	0.77	0.03	0.10	-0.07	0.31	0.04	0.12	-0.08	0.27	0.03	0.11	-0.08	0.28
Immune→OTI	-0.04	-0.04	0.01	0.94	-0.03	-0.06	0.02	0.80	-0.02	-0.10	0.09	0.31	-0.07	-0.01	-0.07	0.46
Cardiov→Fear	0.22	0.06	0.16	0.13	0.11	0.15	-0.03	0.76	0.13	0.12	0.01	0.93	0.18	0.09	0.10	0.33
Cardiov→Stress	0.08	0.01	0.07	0.35	0.04	0.05	-0.01	0.94	0.07	0.02	0.05	0.52	0.12	-0.05	0.18	*
Cardiov→OTI	-0.01	-0.11	0.09	0.36	-0.14	-0.03	-0.11	0.25	-0.11	-0.07	-0.05	0.65	-0.10	-0.06	-0.04	0.68
Digest→Fear	0.11	0.04	0.07	0.41	0.09	0.05	0.04	0.60	0.09	0.03	0.06	0.51	0.07	0.06	0.00	0.96
Digest→Stress	-0.06	0.00	-0.06	0.41	-0.08	0.01	-0.09	0.19	-0.05	-0.03	-0.02	0.75	-0.06	0.01	-0.07	0.34
Digest→OTI	0.04	0.05	-0.01	0.91	0.13	0.03	0.10	0.28	0.08	0.07	0.01	0.94	0.07	0.07	0.00	0.99
LLE →OTI	0.14	0.08	0.06	0.39	0.11	0.16	-0.05	0.50	0.11	0.16	-0.05	0.43	0.17	0.08	0.10	0.16
Fear *LLE→OTI	0.03	0.04	-0.01	0.90	0.01	0.06	-0.06	0.48	0.10	-0.05	0.15	0.07	0.05	0.05	0.00	0.99
Stress LLE→OTI	-0.03	-0.01	-0.02	0.82	-0.04	-0.03	-0.01	0.92	-0.04	-0.01	-0.03	0.73	-0.03	-0.02	-0.02	0.85

Note. Fear = COVID-19 fear; Stress = COVID-19 stress; OTI = outbound travel intention; Mental = mental status; Immune = immune system; Cardiov = cardiovascular system; LLE = leisure and life enjoyment value; *p*-value = permutation p-value, $^{**}p < 0.01$. $^{*}p < 0.05$; Diff = β difference.